

56. (New) A diverter sub comprising in combination:

(a) an inlet of a size and shape to be connected to a tubular and an outlet of a size and shape to be connected to a drill string;

(b) side port means in said diverter through which drilling fluid may flow into said sub;

(c) diverter valve means mounted within said sub for movement between first and second positions;

(d) said valve means being positioned in said sub for closing said side port means in said first position while allowing drilling fluid to flow from said tubular to and down said drill string, and a second position for preventing flow from said tubular to said drill string while allowing drilling fluid to flow through said side port means and down said drill string.

57. (New) The diverter sub of Claim 56 including sealing means surrounding said side port means, and passage means for flowing drilling fluid through said sealing means to and through said side port means.

58. (New) The diverter sub of Claim 57 wherein said passage means include a flow passage extending at least partially

circumferentially about the longitudinal axis of said diverter sub.

59. (New) The diverter sub of Claim 57 wherein said sealing means are of such construction, material and configuration such as to maintain a fluid-tight seal against drilling fluid pressures of at least 5,000 psi.

60. (New) The diverter sub as claimed in Claim 59 wherein said sealing means comprise first and second seal means, and wherein said first and second seal means are positioned above and below said side port means, respectively.

61. (New) The diverter sub as claimed in Claim 57 wherein said sealing means comprise:

(a) an annular seal member surrounding and engaging the external surface of said diverter sub, and;

(b) clamp means surrounding said seal means, and;

(c) means for forcing said clamp means against said seal member for forcing said annular seal member against said external force with a force sufficient to withstand drilling fluid pressures of at least 5,000 psi.

62. (New) The diverter sub as claimed in Claim 57 wherein said seal means surround said side port means and include an annular passage in fluid communication with said side port means, and inlet passage means in fluid communication with said annular passage means for supplying high pressure drilling fluid through said annular passage and said side port means into and down said drill string.

63. (New) The diverter sub as claimed in Claim 57 wherein said valve means include a pivot for pivoting said valve means between first and second positions, and wherein said valve means are positioned and are of such structural design as to be forced into said first and second positions by pressure differentials between the drilling fluid in said tubular versus that in said side port means.

64. (New) The diverter sub of Claim 56 including lever means for opening and closing said valve means, said lever means extending at an angle to the longitudinal axis of said diverter sub.

65. (New) The diverter sub of Claim 56 wherein said diverter sub is integral with one end of said tubular.

66. (New) A method for continuously circulating a drilling fluid down a drill string while tubulars are added to said drill string comprising:

(a) mounting a diverter sub containing a valve at the lower end of each of a plurality of tubulars to be joined to a drill string;

(b) moving said valve to a first position which prevents the flow of drilling fluid from the tubular into the drill string while simultaneously allowing the flow of drilling fluid from outside the diverter sub into and down said drill string while joining a tubular to a drill string; and

(c) subsequently moving said valve to a second position preventing the flow of drilling fluid from outside the diverter sub while allowing the flow of drilling fluid from said tubular downwardly into said drill string after said joint has been made.

67. The method of Claim 66 including the step of sealing the diverter sub against flow of drilling fluid from outside the diverter sub when said valve is not in said second position.

68. (New) The method of Claim 67 including the step of continuing to rotate the drill string in a bore hole while

adding tubulars, and continuing the circulation of drilling fluid down the drill string during such drilling.

69. (New) A valve assembly for use in continuously supplying drilling fluid from a tubular to a drill string comprising:

(a) a valve body having a first inlet passage adapted to be connected to a tubular, and an outlet passage adapted to be connected to a drill string;

(b) said valve body having a second inlet passage, said second inlet passage extending into said valve body at substantially a right angle with respect to that of said first inlet passage and said outlet passage;

(c) high pressure seal means surrounding said second inlet passage;

(d) annular fluid passage means within said seal for flowing drilling fluid from outside said seal into said second inlet passage;

(e) a two position valve positioned in said valve body such as to, in a first position permit flow from said tubular to said drill string while preventing flow from said second inlet passage, and in a second position preventing flow from said tubular to said drill string while permitting flow into said drill string from said second inlet passage; and

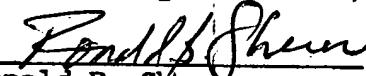
(f) actuator means for moving said two position valve to and from said first and second positions.

70. The valve assembly of Claim 69 wherein said actuator means is positioned outside of said valve body.

71. The valve assembly of Claim 69 wherein said actuator means is positioned within said valve body.

72. The valve assembly of Claim 69 wherein said valve actuator means are responsive to the differential pressure in said first inlet passage versus the pressure in said second inlet passage.

Respectfully submitted,


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